

**WHAT IS CLAIMED IS:**

1. A method of determining a location of one of a plurality of units, each unit being communicatively coupled to at least some of the other plurality of units, wherein at least some of the plurality of units are reference units, whose locations are  
5 known, said method comprising:
  - communicating with the units within communication range of the unit to be located;
  - establishing a neighbor list for the unit to be located and each of a group of associated units, wherein the associated units are a subset of the plurality of units and  
10 include one or more units other than the unit to be located, which are located proximate to the unit to be located, the neighbor list including the list of the units that are in communication range of the respective associated unit;
  - identifying any reference units contained in each of the neighbor lists of the unit to be located and the associated units;
  - 15 determining an aggregate value corresponding to the number of occurrences of each of the reference units in the neighbor list of the unit to be located and the neighbor lists of each of the associated units; and
  - determining the location of the unit to be located based upon the known locations of the reference units and the number of identified occurrences of the  
20 reference units in the corresponding neighbor lists.
2. A method in accordance with claim 1 wherein the associated units include the units within communication range of the unit to be located.
- 25 3. A method in accordance with claim 1 wherein determining an aggregate value corresponding to the number of occurrences of the each of the reference units in the neighbor list of the unit to be located and the neighbor lists of each of the associated units includes counting the number of occurrences.
- 30 4. A method in accordance with claim 3 wherein counting the number of occurrences of each of the reference units in the neighbor list of the unit to be located,

and the neighbor lists of a plurality of associated units includes counting the number of occurrences of each of the reference units in the neighbor list of the unit to be located and the neighbor lists of each of the units contained in the neighbor list of the unit to be located

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5. A method in accordance with claim 1 wherein the location is determined based upon a weighted average of the locations of the identified reference units.

6. A method in accordance with claim 5 wherein the amount of the weighting for a particular reference unit is determined by the ratio of the number of occurrences of the particular reference unit and the total number of occurrences of all reference units.

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7. A method in accordance with claim 1 wherein the communication range of each unit is substantially the same.

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8. A method in accordance with claim 1 wherein the communication range of the unit to be located is smaller than the average distance between reference units.

9. A method in accordance with claim 1 wherein the reference units are substantially stationary.

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10. A method in accordance with claim 9 wherein the substantially stationary reference units are proximately spaced at regular intervals a fixed predetermined distance apart.

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11. A method in accordance with claim 10 wherein the substantially stationary reference units are proximately spaced at regular intervals a fixed predetermined distance apart in one or more substantially orthogonal directions.

12. A method in accordance with claim 1 wherein one or more of the reference units are mobile, and wherein as a reference unit moves the reference unit periodically updates the location of the reference unit.

5 13. A method in accordance with claim 1 wherein as the plurality of units move relative to one another, the plurality of units periodically update the corresponding neighbor lists.

14. A location determination module for use in a system of a plurality of units,  
10 wherein at least some of the units are reference units, whose location are known, and each unit is communicatively coupled to at least some of the other units, the location determination module comprises:

a transceiver having a finite communication range; and

a processor, coupled to the transceiver, the processor including a storage area  
15 for maintaining a neighbor list including a list of the units within communication range of the transceiver, a discriminator for distinguishing between reference units and non-reference units contained in one or more neighbor lists, and a calculation element for determining an estimated location, based upon the number of occurrences of each of the reference units in the neighbor list and the neighbor lists of a plurality  
20 of associated units, and the known location of the reference units.

15. A location determination module in accordance with claim 14 wherein the associated units include the units within communication range of the location determination module. (

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16. A location determination module in accordance with claim 14 wherein the calculation element is adapted for determining an estimated location using a weighted average of the locations of the identified reference units, which are weighted using the number of occurrences of each of the reference units in the corresponding neighbor  
30 lists.

17. A location determination module in accordance with claim 14 wherein the finite communication range is smaller than the average distance between reference units.

5 18. A location determination module in accordance with claim 14 wherein the neighbor list includes units within communication range of the transceiver.

19. A location determination module in accordance with claim 14 wherein the location determining unit is incorporated as part of a mobile communication device.

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20. A location determination module in accordance with claim 19 wherein the mobile communication unit is a cellular radiotelephone.

21. A location determination module in accordance with claim 14 wherein the  
15 location determination module is incorporated into equipment used by a group of individuals acting in concert.

22. A location determination module in accordance with claim 14 wherein the reference units, used in the system of a plurality of units, are stationary beacons  
20 spaced at regular intervals.

23. A location determination module in accordance with claim 14 wherein the reference units, used in the system of a plurality of units, are mobile communication devices having an independent location determining device.

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24. A location determination module in accordance with claim 23 wherein the independent location determining device includes a transceiver having a greater range than the transceivers of the location determination modules, the transceiver of the independent location determining device being adapted for communicating with a  
30 plurality of reference stations.

25. A location determination module in accordance with claim 24 wherein the plurality of reference stations include at least one of one or more orbital satellites and one or more base transceiver stations.
- 5 26. A location determination module in accordance with claim 24 wherein the independent location determining device is adapted for at least one of measuring signal strength and determining time of arrival of a signal transmitted from at least some of the plurality of the reference stations.
- 10 27. A location determination module in accordance with claim 14 wherein one or more of the discriminator and the calculation module includes one or more sets of prestored instructions contained within the storage area and to be executed by the processor.